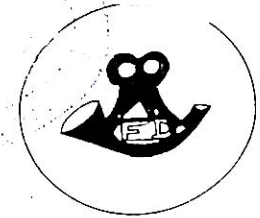


**KENYA FORESTRY RESEARCH
INSTITUTE
(KEFRI)**



**JAPAN INTERNATIONAL
COOPERATION AGENCY
(JICA)**



**FORESTRY DEPARTMENT
(FD)**

**SOCIAL FORESTRY EXTENSION MODEL
DEVELOPMENT PROJECT FOR SEMI-ARID
AREAS**

(SOFEM)

**ANNUAL REPORT FOR 1999
(JAN. – DEC. 1999)**

**EXTENSION METHOD AND INFORMATION
SECTION**

Compiled by: Josephine Kamene

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SOFEM ANNUAL REPORT FOR 1999

1.0 INTRODUCTION

The Social Forestry Extension Model Development (SOFEM) project was launched in November 1997 after the completion of the second phase of Social Forestry Training project (SFTPII). The aim of this project is to equip the inhabitants of semi-arid areas in Kenya with appropriate techniques to plant and manage trees through establishing of farm forests.

The project is divided in to three sections namely: Farm forest establishment (Extension), Technology development (on-station and on-farm) and Extension method and information. *Different activities are undertaken by each section in order to achieve the stated objective.*

During the year 1999, several activities stated in the plan of operation (P.O) were undertaken. Some were completed as scheduled while others continued during the following year. The on-station activities were conducted in the pilot forest with the aim of developing viable and practical technologies that can be adopted by local farmers. The improvement of the demonstration plot (Demo II) in the pilot forest started during this period. The target farmers for 1999 farm forest establishment were selected and a total of 31 farm forests were established within the target areas. For 1999 technology development (on-farm) activities, 6 target farmers were selected and on-farm trial plots established to verify some of the technologies developed in the pilot forest. The technologies tested in these on-farm plots include water harvesting, weeding, and establishment of fodder banks and fruit orchards. To promote the exchange of information in SOFEM and to publicize the project activities, a social forestry seminar was held during this year.

Nine mobile shows were conducted within the three target divisions of Kitui district, that is, Kabati, Chuluni, and Central.

Several activities were conducted as planned but due to some constraints such as lack of adequate finances, breakdown of printing equipment, some of the activities were not completed as scheduled. This report shows the achievements and progress of each activity conducted in 1999.

2.0 RESEARCH ACTIVITIES

The following trials were conducted during the period.

Activity 1.1.1.1 Seed germination

Experiments were conducted to investigate the effects of different concentrations of rooting hormones on the rooting of *Melia volkensii* stems and roots. Different concentrations of rooting hormones were applied on both root and stem cuttings. Fifty root and stem cuttings were planted with IBA root hormone at 0.3%, 0.5% and 0.8% concentrations. Results recorded during this period indicated that for 0.3% and 0.8 % IBA rooting hormone, 3 and 2 root cuttings rooted respectively. It was also realized that the size of the root cuttings is an important factor in this type of vegetative propagation. The 9 root cuttings of *M. volkensii*, which never rooted, were below pencil diameter size. All the stem cuttings sprouted but did not root. Seeds collected from HomaBay for these two species will be germinated together with the seeds collected from within using different pretreatment techniques for comparison purposes.

Activity 1.1.1.2 Root system

The objective of this activity is to determine the rooting pattern of different tree species, relate it to their survival, growth, and drought-resistance and to investigate the possibility of inter-cropping.

Root mapping for the targeted seven species was done and surveillance for the reporting period was completed.

Activity 1.1.1.3 Insect/disease control

Data collection was done in 1996 and 1997 nursery experiments.

Activity 1.1.2.1 Water catchment trial

The objective is to determine the appropriate type of water catchment structure in relation to growth of *Senna siamea*. Three types of catchments were tried namely W-shaped, V-shaped and Square-shaped structures (ground divisions). The data showed there was remarkable performance in growth (height) where ground divisions were constructed. Where W-shaped structures were used the performance is almost similar to the ground division structures. V-shaped structures ranked lowest in performance (see graph 1). The above changes were observed clearly after the rains with ground divisions and W-shaped structures showing a sharp change in growth performance. The trial shows the advantage of water catchment construction that captures larger volume of water, that is, ground divisions and W-shaped.

However, from field observations the ground division type of catchment are more labor intensive to construct and repair, and their efficiency is dictated by their size that is, the larger the better. Therefore, W-shaped structures could be recommended since their output in terms of tree growth is almost just as good.

Activity 1.1.2.2 Mulching Trial

The objective is to study the effect of sand and murrum mulching on growth of *Senna siamea*. Results (graph 2) indicate that, mulching encouraged better growth performance especially where murrum was applied as compared to either sand or control plots. However, after one and half years there was no significant difference between the two treatments and the control.

This phenomenon could imply that mulching effect may only be useful up to a certain period after planting, in this case one and half years after planting. Thereafter, it is possible that the roots of the trees are deep enough not to be interfered with in terms of water fluctuation due to surface conditions.

Activity 1.1.2.3 New weeding trial

The objective of setting up this trial is to compare the effectiveness of complete weeding and slash weeding on growth and survival of *Senna siamea*.

Data was collected from an old weeding trial. It was observed that complete weeding gave better results in terms of growth as compared to slashing.

From the data collected, (graph 3) it was observed that the growth rate of trees in completely weeded plots, had a gradual increment as well as higher rate of performance compared to trees in slashed areas.

Based on the old trial complete, weeding operations could therefore be recommended during the initial stages of tree establishment in order to reduce competition for soil moisture and surface nutrients.

In a new trial, site preparation and ripping was carried out a new site to loosen the soil. The equipment in the old weeding trial were removed and installed in the new one. These equipment include

The weather mast and its accessories, and the four data loggers for soil moisture and soil temperature data collection and the soil moisture probes.

Activity 1.1.2.4.1 Soil moisture content studies

A new set of equipment was installed for the purposes of gathering accurate data on soil moisture content in the pilot forest. This equipment uses soil moisture and soil temperature sensors. The data is recorded automatically after every 30 minutes in an on the site CR10X measurement and control module or data logger from which it is accessed into a computer. Monthly data collection using the old small equipment called Moisture point probe continued since it can cover a larger area.

The growth effect of mulching (*senna siamea*) was assessed and compilation of the data is in progress. Installation of five data loggers was done in the new weeding trial. Holes were also constructed for installation of five tipping buckets for measuring surface water and soil run-off.

Activity 1.1.2.4.2 Sun heat shield effect trial

This trial was set up to investigate the cause of decreasing effect of mulching 2 years after planting.

Activities undertaken in this trial plot include:

Site preparation

Fencing

Construction of micro-catchment

Slashing, weeding and murrum mulching

Sun heat shield net laying

Assessment of this experiment will be done on a 3-month (quarterly) interval after planting. The main equipment used includes sun heat shield net and moisture point.

Activity 1.1.2.4.3 Water Stress

The purpose of this experiment is to determine the effect of pruning on water stress in *Dalbergia melanoxylon* and *Melia volkensis* during the dry period. The trees were pruned at half height and others were not pruned so as to act as control.

From the data collected and interim analysis it was observed that pruning only decreased water stress significantly in *D. melanoxylon* during the heavy rain season while no significant difference was observed for the *M. volkensis* trees pruned and those not pruned. This has the implication that *M. volkensis* is more drought resistance. However, during the dry season no significant difference was observed between the trees that were pruned and those not pruned for both species.

Activity 1.1.2.4.4 Evapo-transpiration studies

Studies on tree water uptake by monitoring stem sap flow started during this period and will continue for the next few years. Heat pulse probes are connected from the tree being measured to the data logger (CR10) and the data (rates of transpiration) is recorded after every 15 minutes. Data collection was done and compilation continued over this period.

Activity 1.1.3.1 Spacing trial

The objective of this trial is to study the effect of spacing on growth and survival of *Senna siamea* and *Azadirachta indica*. Analysis of previously collected data is in progress.

Activity 1.1.3.2 Pruning studies for existing plots

The objective is to study the effect of pruning on growth and survival of selected tree species. A pruning trial was set up in November 1999. Pruning studies were conducted on *Senna siamea* and *Dalbergia melanoxylon*. Data collection is in progress.

Activity 1.1.3.3 Thinning studies on existing plots

The objective of this trial is to study the coppicing ability of existing plots. A four year-old *S. siamea* plot was used. Measurement of thinned stock for eventual volume table construction started in June. Interim results indicate that high thinning rates (60%-76%) encourage higher height/diameter growth as compared to either 48%-52% thinning rate or control. The improvement in height and diameter growth could be attributed to reduced competition for sunlight through thinning.

By carrying out thinning operations, the exposed canopy allows the remaining stock to utilize the available sunlight more efficiently hence higher growth rate. A similar trial will be set for *Azadirachta indica*.

Activity 1.1.3.4 Coppicing studies for existing plots

Coppicing ability tests were conducted on *S. siamea* to determine optimum coppicing height on a two-year-old plot. The trial plot was established in March 1999. Monitoring and data collection is on progress.

Activity 1.1.4 Establishment of wild fruit demonstration trial

This trial was set with the objective of testing the growth performance and yield of some commonly used local dry land fruit tree species.

The first assessment on this orchard was done and the parameters measured include height and diameter at ground level (DGL) or the root collar diameter.

The trial, established in 1998, will be used for demonstration and also as a seed orchard for production of wild fruit. The survival rate is 44%, which is very low. This could be as a result of drought (150mm of rainfall in 1998) and animal damages. Efforts being made to keep off the.

Site preparation for the season's planting was done and a new trial for 1999 set up. The species planted include:

<i>Ziziphus mauritania</i>	<i>Annona senegalensis</i>
<i>Vangueria rotundata</i>	<i>Adansonia digitata</i>
<i>Berchemia discolor</i>	<i>Premna chysoclada</i>
<i>Sclerocaryea birrea</i>	<i>Tamarindus indica</i>

Activity 1.1.5.1 Weather monitoring data for pilot forest

A new weather station was installed due to the overshadowing of the previous weather station by the canopy of *Senna siamea*.

This new station has additional parameters of wind direction and speed unlike the previous one, which could only take rainfall, temperature radiation and relative humidity.

Collection of weather data continued as normal in the new weeding trial. Parameters measured in the pilot forest include temperature, relative humidity, solar radiation and rainfall. Wind direction and wind speed will also be measured after obtaining computer programs for the equipment.

Activity 1.1.5.7 Study of work efficiency

This activity is aimed at determining the labour efficiency and productivity (input/output ratio) and to ease the management of pilot forest.

Data collection and compilation continued over this period.

Activity 1.2.1 On-farm Experiments

The on-farm experiments are aimed at verifying the developed technologies in different areas and under different field conditions using the farmer's resources. Such technologies are also demonstrated to farmers and the communities neighbouring the selected farmers. Data on survival count, height and diameter for the three on-farm target farmers selected in 1998 was collected. Weekly monitoring, recording of rainfall, and weeding of the plots as well as repairing of the water harvesting structures (micro-catchments) was carried out.

Establishment of six on-farm trials for 1999 was completed. Staking, digging and construction of micro-catchments was done in preparation for planting. The technologies verified were weeding, water catchment and land preparation methods.

Activity 1.2.3 Introduction of new technologies

This was done to test technologies not developed in the pilot forest. The two technologies introduced include establishment of fodder banks and fruit trees (grafted mangoes and budded oranges). Two fodder species namely: *Leuceana leucocephala* and *Calliandra calothyrsus* were introduced.

Activity 1.2.4 Weather monitoring and Soil Sampling

Thirteen rain gauges were installed in new farms within the four project working divisions namely Central, Chuluni, Mutomo and Kabati. These areas continued to receive rainfall until December.

Rainfall was recorded in Tiva, Kitui centre and in some of the target farms as shown in Appendix 1.

Dr. Takato completed soil survey in Tiva pilot forest and in the farms of selected farmers and a report was prepared.

3.0 ACHIEVEMENTS

3.1 Technology Development (On-station)

Activity 1.1.5.3 Plantation maintenance

Routine activities conducted in the plantations for maintenance purposes include weeding, stem support, water catchment maintenance and machine bush clearing. Weeding was done in the 1997 spacing trial plot of *Acacia senegal*.

Stem support was done in the same plot in order to discourage ground-spreading tendency of the species. Roadside machine bush clearing was done to improve visibility for road users and to get material for dead fence repair within neighbouring plantation plots.

With the on-set of rains, the main focus was directed towards establishment of new plots hence the only maintenance activity undertaken was that of repairing micro catchments as indicated below:

Activity	Compartments	Quantity	Year planted
Water catchment repair	Old yahata experiment	1180	1995-1995
Micro-catchment repair	Spacing trial	518	1996

Activity 1.1.5.5 Management of Tiva arboretum

Australian acacia (*Acacia holocoleicea*) was replanted with different species such as *Dalbergia melanoxylon* and *Eucalyptus camaldulensis* in the 1995 seed stand. Tractor weeding was done in 1995 and 1996 seed stands. However, livestock browsing and water stress affected the trees.

Activity 1.1.5.6 Protection

Animal damage

Daytime patrol continued and it was observed that illegal grazing reduced at the onset of rains. Dead fence repairs were conducted for plots 48 (1996), 43 (1996), 39 (1996), compartments 1(A, B, C, D, F), 2(A, B, C) and the wild fruits.

Human damage

One metal signpost was reported stolen. An attempted robbery was also reported on 13/11/99 in the old Yahata experimental site but the equipment was not tampered with. Only four arrows and one machet were stolen. Security was stepped up by having additional security personnel, 2 for day shift and 5 for the night shift.

3.2 Technology Development (On-farm)

Activity 1.1.5.1 Weather Monitoring

Rain gauges were installed in 6 farms. It is planned that 15 rain gauges shall be installed in the farms of the newly selected farm forest and on-farm target farmers.

Activity 1.1.5.4 Seed collection, production and supply of seedlings

Seed collection

Seeds of the following species were collected:

Species	Amount(Kg.)	Collection site
<i>Mellia volkensii</i>	253.8	Kitui town, Kyuso, Nuu,Kavisuni
<i>Azadirachta indica</i>	8.7	
<i>Azanza gerkeana</i>	9.5	
<i>Jacaranda mimosifolia</i>	6.0	Ikanga market
<i>Dalbergia melanoxylon</i>	10.5	
<i>Terminalia brownii</i>	5.0	Mumbuni-Machakos,
<i>Eucalyptus camadulensis</i>	1.8	Homabay
<i>Senna siamea</i>	9.4	Yatta/Tiva site
<i>Moringa oleifera</i>	7	
<i>Dovyalis caffra</i>	39.	
<i>G. robusta</i>	17	
<i>Sclerocaria birrea</i>	16.5	
<i>Terminalia mentalis</i>	7.5	

Seeds of several wild fruit tree species were also collected.

<u>Species</u>	<u>Collection site</u>
<i>Syzygium cuminii</i>	Kwale
<i>Ulvaria lucida</i>	”
<i>Flacourtia indica</i>	”
<i>Zyzipus mauritania</i>	Kilifi
<i>Annona senegalensis</i>	Kwale/Mbitini
<i>Laranthus uluguense</i>	Ikanga
<i>Vitex doniana</i>	Mbitini

The seeds of *Calliandra calothyrsus* and the seedlings of grafted mangoes were bought.

Seedling production and distribution

The nursery stock had 17450 seedlings as at October 1999.

Some seedlings were not healthy while others dried up due to excess water salinity thus reducing the number of seedlings to 17399.

Most of the seedlings were either issued free to farmers near the project area, contact farmers, workers or sold to willing farmers. Seedlings were also distributed to other sections of the project for planting in the pilot forest, on-farm trials and farm forests. A total of Ksh.22002 was raised out of the seedlings' sales. See the 1999 Nursery stock and seedlings distribution table in Appendix 2

Activity 1.2.1 Farmers selection

Selection of farmers for 1999 on-farm trials was done. The major criteria used included willingness, accessibility, eco-zone

Below are the names of farmers selected and the technologies to be verified:

Divisions	Farmer's name	Technologies being verified	Remarks
Chuluni	Ruth K. Kyama	Fodder	Establish fruits
	Christine N. Kitema	Weeding techniques	“
Mutomo	Gabriel M Ndetei	Water harvesting	“
	Manundu Nyamai	Weeding	“
Central	Justus W. Makanda	Fodder	“
Kabati	George Mwaniki	Fodder	“

Activity 1.2.1.1 Collection of physical and weather condition data

Routine monitoring of the on-farm experiments continued over this period and second data collection was done in mid May.

The rainfall record for the period under review is as shown below:

Rainfall record (unit mm)

MONTH	KTC	TIVA	CENTRAL		KABATI		CHULUNI	
			LUCIA	MATINDIA	NGULI	MUTWII	NGONDE	KYENZA
Jan	3.0	0.0	0.5	0.0	0.0	0.0	15	25.5
Feb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.5
Mar	195.0	58.5	115.5	126.0	150.0	136.0	127.0	246.5
April	159	82.5	144	103	116	68.5	95.5	167.5
May	30	4.0	15.5	13	40.5	13.5	22	22.2
June	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
July	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aug.	2.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0
Sept.	11.0	0.0	0.0	4.5	8.0	0.0	0.0	0.0
Oct.	1.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0
Nov.	223	187.5	328	308.5	453	261.5	357.5	441.6
Dec.	237	141.5	166.5	226.5	314	204	171	102.5

3.3 Farm Forestry Establishment (Extension)

Activity 2.1.5 Monitoring of farm forest establishment

The DFEOs and the project TAs were undertaking this activity. Assessment of height and diameter in the farm forests was done for all tree species except *Carica papaya*. During the monitoring exercise, it was noted that several *Mangifera indica* trees in Kabati division had scattered leaves and others had become dormant. Signs of water stress were also observed on *Mangifera indica* and *Citrus sinensis* hence farmers started bottle watering. *Melia volkensii* in central division had started yellowing but the cause of the problem was not identified.

Construction of shades to protect seedlings from scorching sunlight was done. Rainwater harvesting micro-catchments were repaired.

Most of the seedlings were found to be doing well. Early flowering was noticed on several *Mangifera indica* and *Citrus sinensis* trees in Kabati and Central division. Constraints encountered in these farm forests include browsing due to poor fencing, drought and aphid infestation on *M. indica* in Kabati division.

Activity 2.1.6 Record keeping

This involves recording the process and progress of farm forest establishment. Important information recorded in the monitoring sheets included monthly survival, mortality reasons, and general health of surviving seedlings. Other visits and advises given to the farmers are recorded in the notebook kept by farmers. Initial diameter and height were recorded in the assessment sheets.

Activity 2.2.1 Review of SFTP (II) Extension Approaches

The report on SFTP (II) Extension Approaches review was completed and it is indicated under the list of publications.

Activity 2.3.1 Guideline for Farm Forestry Establishment

A farm forestry guideline was prepared which the SOFEM extension agents can use to properly guide farmers interested in farm forestry. The first and second drafts were produced during this period.

Activity 2.4.1.1 Implementation of training course

A training course for both project's and Forest department's Technical assistants was held from 7th to 11th June 1999. This was aimed at equipping the TAs with the necessary knowledge for establishment of farm forest. Thirteen participants attended the course.

Activity 2.4.3 Training of target farmers

Target farmers for both farm forest establishment and on-farm activities were trained on 12th – 15th October 1999. One or 2 members of the families of the target farmers were invited to attend the course. A total of 57 people attended the course and out of them 9 were technical assistants.

Activity 2.4.5.1 Designing of farm forests

Designing of farm forests in the farms of 31 newly selected target farms and 6 old target farmers was done in August. Seedlings for farm forest establishment were procured. The farmers paid half price for all seedlings of other species apart from fruit tree species. Due to scarcity of fruits, the project purchased and provided the same to the farmers.

Activity 2.4.5.2 Establishment of 1999 farm forests

Thirty-one new model farms were established. A total of 2087 fruit/tree seedlings were planted, out of which 169 seedlings were planted by the old six model farmers in new sites. See the list of species and number of seedlings planted per division in Appendix 3).

Kitui seedling information update

This is a support activity under 2.4.5.2 and it is not in the original plan of operation. This type of information will help the farmers who want to establish forests to know where they can obtain the seedlings they need. The seeding information update was completed and produced for distribution in major public places in the three divisions namely, Chuluni, Kabati, and Central.

Items listed include:

Species number

Producers and their location

Contact persons

Activity 2.4.6 Improvement of demonstration plot in Tiva

The house unit

- Activities undertaken include:
- Installation of charcoal cooler in the kitchen
- Painting of kitchen unit
- Construction of 2 Enzaro jikos and Maendeleo jiko
- Renewal of the charcoal water filter material
- G.I sheet pipe chimney installation on the Enzaro Jiko

The compound

- The following activities were carried out:
- Name-plate labelling of all activities conducted
- Dressing of the live fence of *Commiphora spp* enclosing the livestock pen
- Installation of main entrance gate to control trespassing persons, domestic, and wild animals.
- Routine upkeep of ornamental and shade plants
- Wooden gate construction
- Construction of pit latrine and installation of breather chimney

The small scale nursery

- Maintenance of the demonstration small scale nursery
- Vegetative propagation of Bamboo using rhizomes and cuttings
- Maintenance of various amenity trees/flowers
- Acquisition of new local and indigenous flower species, improved fruit tree species including grapes
- Improvement of the nursery Earthworm rearing shade.

The Home garden

- Three indigenous species were introduced namely *Amaranthus hybridus*, L. (Terere), *Gynadropsis gynadra*(L) Brig (Mchicha), and *Solanum nigrum* L (Managu)
- Exotic vegetables introduced include Bulb onions, leaf onions, cow peas, Sukuma wiki, Spinach, Tomatoes, Pepper, Carrot
- Other crops introduced include Sweet and Irish potatoes, Arrow roots, Bananas and Sugarcane
- Installation of one-bucket drip watering unit developed by KARI
- Regular maintenance of planted crops and introduction of new crops such as different banana and sugar cane species.

The Agroforestry plots

Activities undertaken include the following:

- Planting of hedge row of *L. leucocephala* , *L.diversifolia* and *Gliricidia sepium* intercrossed with seven subsistence crops.
- Planting of Cassava and 20 bamboo seedlings
- Sowing of sorghum and millet
- Planting of improved citrus seedlings under different water supplementing methods
- Installation of simple bamboo pipe drip watering for pigeon peas and cabbage

- Fencing the agroforestry garden

Pilot technology block

Soil improvement technologies included the following:

- Contour basket composting
- Earthworm farming techniques, which involved inoculation of two plots of beans with earthworm soil. Positive phenotypic response in growth was observed.
- Liquid manure techniques which gave better vegetable yield
- Introduction of *Crotalaria* as improved fallow shrub on degraded site planted with beans in order to determine its effect on yield.

Soil moisture conservation

- Tyre watering techniques which showed better growth on both trees and vegetables
- Mulching techniques using charcoal, and grass. A more positive response was observed for charcoal mulched trees.

Pest control

- Local material based pesticides proved ineffective against the diverse pests, which occurred during the rains. Therefore, commercial pesticides were used for urgent elimination of the pests.

Efficient water use

- Roof water harvesting using bamboo gutters in to the fishpond proved economical. Re-use of fishpond water for crop growth was also done.

Improvement /Development of farm tools and implements

- A cheap durable and lightweight weeding fork was fabricated and 6 prototypes were produced locally.

Fish culture

- A small fishpond measuring 5m x 1.5m x 1.5m was constructed and 50 local tilapia fingerlings introduced. These multiplied quickly but did

not develop to the expected sizes. This could be attributed to the fact that water is stagnated and the space is small for the species.

Apiculture

- Bees were introduced in the traditional beehive and are now ready for honey harvesting.

Other activities

The land rehabilitation block was machine-ploughed and planted with cotton so as to utilize water conserved by the already constructed soil conservation structures.

Other technologies demonstrated in this plot include:

- Moringa water purification and Moringa vegetable cooking which were demonstrated to Kilimanjaro village forestry project team who visited the project in March.
- Successful house rearing of earthworms using a 20-litre plastic can and harvesting of one kilogram of dry weight termites for chicken feed formula for development trial.

3.4 Extension Method and Information

Activity 3.1.1 Clarify information flow

The objective of this activity is to make clear the current situation of information flow within and outside KEFRI, Forest Department and other concerned institutions.

The final report on information flow between KEFRI, FD and other concerned institutions was completed. Revision will be done later in order to include any other necessary information.

Activity 3.1.2 Preparation of guideline for information activities

This is aimed at well-organized collection, handling and storage of records of SOFEM project activities. Preparation of the final draft is underway.

Activity 3.3.1 Collect and analyse publications

This involves collecting publications on social forestry extension activities and extracting useful information to create information resource base for social forestry extension. Books purchased with 1998 budget were ordered from U.K. and the system of registering the number of books purchased by the project was put under consideration in consultation with librarians in Muguga and Kitui Centre. A hundred and sixty three publications purchased in 1998 were registered at the Kitui centre library.

Preparation of abstracts for publications purchased in 1997 continued.

Activity 3.3.2 Exchange information with concerned institutions

The objective of this activity is to receive useful information and experiences on establishment of farm forests from other concerned institutions.

To achieve this, the project staff visited Kilimanjaro village forestry project (KVFP) in Same district, Tanzania from 22nd to 26th February 1999. A report on this visit was prepared. The Tanzanian team from KVFP also visited the Kitui SOFEM Project from 1st to 5th March 1999.

The section staff also visited Miti Mingi Mashambani Project in Nakuru and VI-Agroforestry project in Kitale.

Reports on the 3 projects visited have been completed. Contacts were also being made to visit GTZ project in Embu.

Activity 3.3.3 Collect and analyze successful cases of established farm forests.

The report on the visit to Kajiado was circulated and comments received. Contacts were made in preparation for the next visit to Tharaka and Mbeere.

Activity 3.4.1 Keep record of project activities

This activity is aimed at ensuring that all the useful information accumulated through project activities is recorded and stored appropriately. Such information will be useful in developing an appropriate social forestry extension model.

Sectional annual reports were received and an annual report based on Kenyan financial year (June 1998 to June 1999) was prepared but only for use by KEFRI. Preparation of this report (SOFEM annual report) for the period Jan to Dec.1999 started during this period. Quarterly reports for the year 1999 were also prepared.

Activity 3.4.2 Collect information from farmers and extension agents

The aim of this activity is to gather useful local knowledge from farmers and extension agents and to ensure that their views are included in the development of appropriate social forestry extension model.

The technical assistants and Divisional Forest Extension Officers continued to collect information. During the training of target farmers held in October, the importance of this activity and the need for the farmers to co-operate was stressed.

Activity 3.5 Develop extension materials on the establishment of farm forest for extension agents

The objective of this activity is to process and compile project findings in order to share the same with farmers, extension officers and other interested parties.

The shooting of a video on Miti ni Mali part II commenced during this period.

A manual on making and use of Enzaro jiko was produced and distributed.

Activity 3.6.1 Publishing project newsletter

This activity is aimed at publicizing activities of the project and creating awareness about new technologies available to farmers.

The first issue of the project newsletter was completed over this period and a total of 2000 copies were distributed towards the end of March.

Six articles out of the expected 8 were received and preparation for production of the second issue of newsletter is in progress.

Activity 3.6.2 Dissemination of information through other media

This activity aims at popularizing project activities through popular information channels and to enhance transfer of technology developed by the project through other media.

The members of this section continued to seek for the possibility of disseminating information on SOFEM through other media with the assistance of PRO-MENR. Contacting the PIO-Embu and DIO-Kitui was also in plan for the achievement of this activity.

Activity 3.6.3 Hold seminar on Social forestry

This is aimed at creating awareness and publicizing SOFEM project and its activities, and to receive wider views and suggestions on how to improve the implementation of SOFEM project. It also aims at sharing and exchanging experiences and ideas in the promotion of Social Forestry in East, Central and Southern Africa region.

The social forestry seminar was held in Muguga from 27th - 30th September highlighting activities of the four sections in SOFEM project. Preparation of the proceedings for the seminar held in September 1999 continued during this period.

Activity 3.6.4 Implementation of mobile show

This activity aims at creating awareness on SOFEM and promoting the importance of tree planting to farmers in target areas (Kabati, Central, and Chuluni divisions) through showing videotapes and distributing training materials.

Three mobile shows were held as from 24th August to 10th September 1999 in each of the three divisions namely Kabati, Chuluni and Central.

A total of 1218 participants attended the shows out of which 662 were adults and 556 were children. Evaluation data collected during the mobile shows is being analysed.

4.0 COLLABORATION

The SOFEM project maintained good relationship with governmental ministries such as Ministry of Agriculture and Livestock Development and non-governmental organizations such as Belgium and Israel project in Kibwezi and Kitui Agricultural Project (KAP) among others. SOFEM project activities continued well. The Centre collaborated well with other institutions/organizations by offering its facilities and staff for workshops, seminars and other activities.

5.0 SPECIAL EVENTS

- The senior vice-president of JICA Mr. Azuma accompanied by the Japanese ambassador Mr. Aoki in May 1999 visited the SOFEM project in Kitui Centre.
- Monitoring was done for the SOFEM project in preparation for the joint steering committee, which was held in April 1999.
- The Chief Conservator visited the Centre and was pleased with the activities being undertaken by the SOFEM project through the joint support of KEFRI, FD and JICA.
- KEFRI's Board of Management visited the Centre and observed the project activities in the pilot forest project and the SFTP II farmers. All KEFRI scientists met in Kitui centre for 4 days in order to synthesise research concept notes written previously by individual scientists.
- Kitui centre participated in ASK shows held in Machakos.
- The JICA project management consultation mission visited the SOFEM project in November 1999.

6.0 PUBLICATIONS

The following reports and publications were produced during the year 1999:

- Reports on Review of SFTP II extension approaches (Lucas Rateng, March 1999).
- Selection of Target Farmers from former SFTP II target farmers (Ali Atanas and H. Yamauchi, March 1999).
- Report on Technology Exchange Program (KEFRI, FD, JICA, 1999).
- Study tour report to Rift Valley and Western Kenya (Extension Staff March 1999).
- Charcoal water purifier (March 1999).
- Proceedings of the workshop on socio-economic and resource survey methodology, (Bernard Owuor and Lucas Rateng).
- Technology workshop implementation report (J. K. Kalumbu).
- Farm Forest Establishment Guideline for Extension Agents (Extension Staff 1999)
- Enzaro jiko pamphlet (March 1999)
- Story picture (May 1999)

In addition to the above publications, several papers were presented Social forestry seminar held in Muguga centre. These papers will be compiled as proceedings.

7.0 MAN POWER STATUS

As at the end of December 1999, the workforce was 130 KEFRI permanent staff, 1 KEFRI casual, 5 Sclerocarya project casuals and 61 JICA casuals.

8.0 APPENDICES AND GRAPHS

Appendix 1: Rainfall records(Oct - Dec. 1999)

(Unit: mm)

Month	K.T.C	Tiva	Central					
			Kaunda	Muia	Lucia	Pius	Isaac	Justus
October	1	0	0	0	0	0	0	0.2
November	223	187.5	442.3	364	328	308.5	295	227.2
December	237	141.5	355.5	274.5	166.5	226.5	188.5	175.5
Total	461	329	797.8	638.5	494.5	535	483.5	402.9

(Unit:mm)

Chuluni						
Edith	David	Munyalo	Ngonde	Ruth	Christine	Kavutha
1	0	0	1	0	0	1
441.6	313.3	362.1	357.5	227.5	288.5	258.5
102.5	260.2	360.3	171	132.5	151.5	185.5
545.1	573.5	722.4	529.5	360	440	445

(Unit :mm)

Kabati					Mutomo	
Musangi	Titus	Beatrice	Mutava	Monica	Gabriel	Manundu
53	7.5	0	0	0	0	0
193.2	365.5	261.5	432.5	453	289.8	291
80.5	374	204.8	467.9	314	132	89
326.7	747	466.3	900.4	767	421.8	380

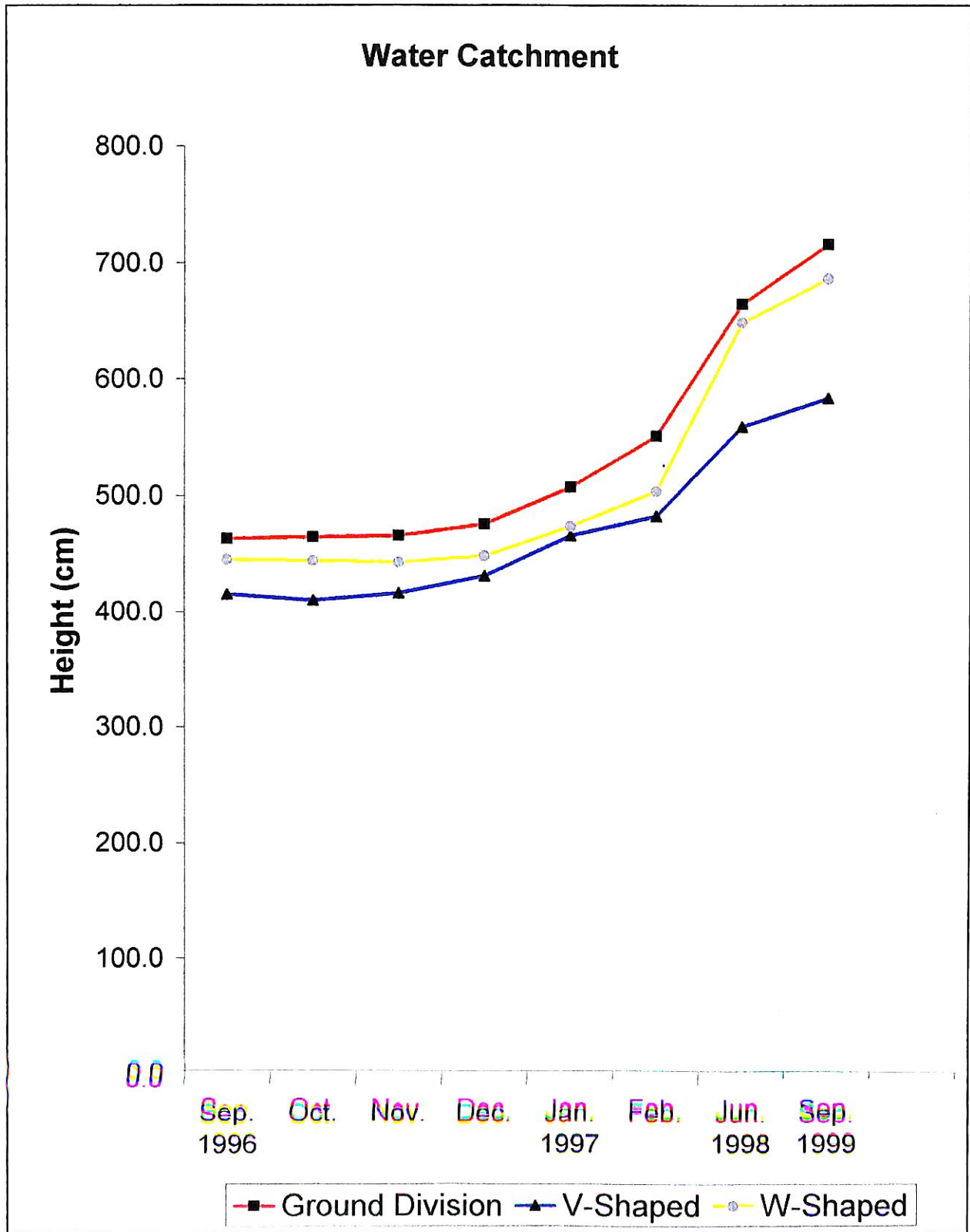
**APPENDIX 2: 1999 TIVA NURSERY
NURSERY STOCK AND SEEDLING DISTRIBUTION**

Nos	SPECIES	Initial Stock (1/11/99)	Used by Project										Total	Balances 15/12/99
			Technology On-Station	Seedstand & Nursery Ex	On farm	Ex Demo II	F. Forestry Ext.	Nearby Farmers	Sold	Distributed to Workers	Distributed to Schools	Damaged		
1	<i>Azadirachta indica</i>	1151			69	5	54	196	187	200		40	751	400
2	<i>Calliandra calothyrsus</i>	160			59	20	54			5		10	148	12
3	<i>Casuarina equisetifolia</i>	444				5	5	220	30	180	4		444	0
4	<i>Dalbergia sisoo</i>	108		16		5		3		4			28	80
5	<i>Delonix regia</i>	128						93		35			128	0
6	<i>Dovyalis caffra</i>	3376						1390	1177	793		16	3376	0
7	<i>Eucalyptus camaldulensis</i>	600		28		5	192	210	14	101	50		600	0
8	<i>Ficus benjamina</i>	5				5							5	0
9	<i>Grevillea robusta</i>	2440		270	66	65		309	250	900	580		2440	0
10	<i>Jacaranda mimosifolia</i>	91					48	23	-	20	-		91	0
11	<i>Leucaena leucocephala</i>	1000			119	130		173		210			632	368
12	<i>Melia volkensii</i>	245			103	5	71						179	66
13	<i>Prosopis pallida</i>	195		85	90	5		10		5			195	0
14	<i>Senna spectabilis</i>	187						89		90			179	8
15	<i>Senna siamea</i>	4230	510		120	50	10	900	1200	1160	260		4210	20
16	<i>Terminalia mentalis</i>	80						50		30			80	0
17	<i>Adansonia digitata</i>	67	18	-	-	-	-	-	-	-	-	-	18	49
18	<i>Berchemia discolor</i>	249	18			5		20		6	-		49	200
19	<i>Carrica papaya</i>	426		4		25	10	64	20	189		114	426	0
20	<i>Grewia villosa</i>	30		15				7		8			30	0
21	<i>Lauranthus ulugnense</i>	32				16							16	16
22	<i>Mangifera indica</i>	40			12							28	40	0
23	<i>Psidium guajava</i>	187			2			84	9	64		20	179	8
24	<i>Sclerocarya birrea</i>	430	54	5	10	3			128	100	20		320	110
25	<i>Tamarindus indica (Thailand)</i>	86	9					48	29				86	0
26	<i>Tamarindus indica</i>	715	18		10	5				7		5	45	670
27	<i>Vangueria rotundata</i>	203	27		10	5		16	5				63	140
28	<i>Zyziphus mauritania</i>	286	18	39	10	20		34	5	40			166	120
29	<i>Syzygium cuminii</i>	208		8		5			6				19	189
	Totals	17399	672	470	680	384	390	3983	3060	4147	914	233	14943	2185

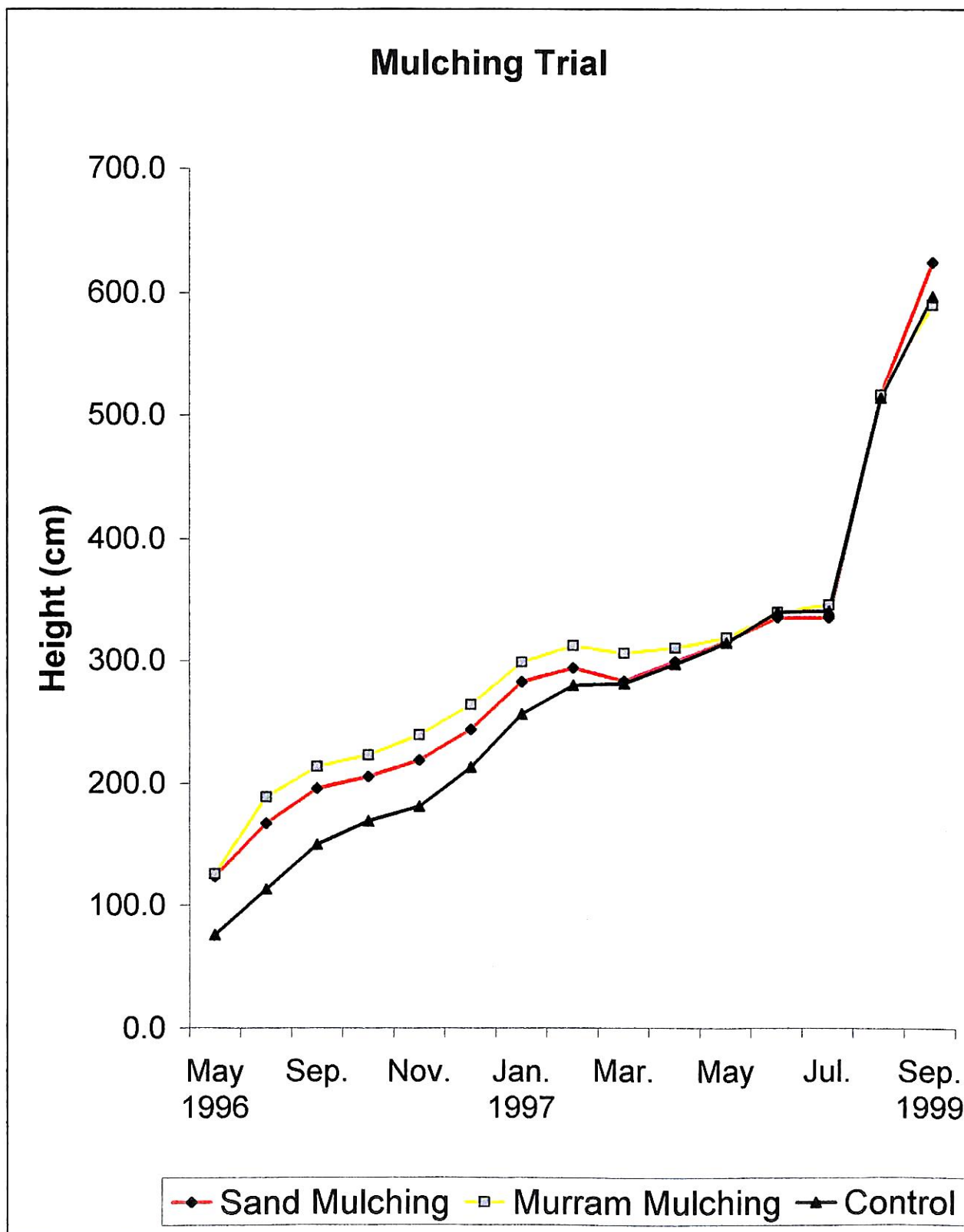
Appendix 3: Species and seedlings planted per division

No of seedlings per division Species	Central	Kabati	Chuluni	Total
Mango	55	74	111	240
Citrus	88	63	20	171
Avocado	28	56	29	113
S siamea	48	99	170	317
G.robusta	142	273	145	559
E.camadulensis	174	135	20	329
C.equisetifolia	21	18	70	109
J mimosifolia	8	-	32	40
A.polyacantha	-	13	20	33
A.indica	-	11	40	51
M.volkensii	-	13	58	71
C.lusitanica	-	10	20	30
S.spectabilis	-	0	8	8
L.leucocephala		0	5	5
T.mentalis		0	3	3
C.papaya		8	-	8
Totals	563	773	751	2087

Graph 1:Water catchment



Graph 2: Mulching trial



Graph 3: Weeding trial

